



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,374	03/27/2001	Xiao-Dong Sun	RD-27727	3259
6147	7590	10/18/2004	EXAMINER	
GENERAL ELECTRIC COMPANY GLOBAL RESEARCH PATENT DOCKET RM. BLDG. K1-4A59 NISKAYUNA, NY 12309			MACCHIAROLO, PETER J	
			ART UNIT	PAPER NUMBER
			2879	

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/681,374	Applicant(s) SUN ET AL.	
	Examiner Peter J Macchiarolo	Art Unit 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-25 and 39-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-25 and 39-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The reply filed on 08/04/2004 consists of changes to the claims, and remarks related to the prior rejection of claims in the previous Office Action. The above have been entered and considered. However, pending claims 1, 2, 4-25, 39-47 are not allowable as explained below.
2. The Examiner notes the previous Office Action stated at numbered paragraph 17 that claim 2 would be allowable if “rewritten in independent form including *all of the limitations of the base claim* and any intervening claims,” (emphasis added). Since rewritten claim 2 does not include all of the limitations of base claim 1, claim 2 is not allowable.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claim 47 is rejected under 35 U.S.C. 102(e) as being anticipated by previously cited Jin et al (USPN 6250984: “Jin”).**

4. In regards to claim 47, Jin discloses a composition for electron emitters comprising a mixture of carbon nanotubes and oxygen-containing compounds of alkaline-earth metals (Y-Ba-Cu-O; col. 6, ll. 14-19), wherein said oxygen-containing compounds are other than oxides, and

Art Unit: 2879

wherein said carbon nanotubes have a diameter in a range from about 1 nm to about 200 nm (col. 7, ll. 21-26).

5. The Examiner notes that the preamble recites that the composition is used for gas discharge devices. This is an intended use type preamble, since it merely recites the intended use of the composition. Where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone, the preamble is generally not accorded any patentable weight. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). In this case, the preamble has been considered, however is not patentable over Jin since the composition can be used for gas discharge devices.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1, 2, 4-25, 39-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heuvelmans-et al (USPN-6137225; "Heuvelmans") in view of previously cited Tsai (USPGPUB 20020121856; "Tsai").**

7. In regards to claims 1, 39, and 40, Heuvelmans shows in figure 2, a composition for electron emitters of gas discharge devices comprising oxygen-containing compounds of only alkaline-earth metals (only magnesium oxide) coated on the electron emitters. Heuvelmans

Art Unit: 2879

further discloses the composition manufacturing process may be easily adapted to existing production processes with different electron-emitting material.¹

8. Heuvelmans is silent to the presence of carbon nanotubes in the composition, but instead carbonizes part of the composition.²

9. However, Tsai teaches that including carbon nanotubes (which are known to have a diameter between 1 and about 10nm) on an electron emitter for a gas discharge tube allows for extended service life of the device.³ One would be motivated to substitute Tsai's carbon nanotubes for Heuvelmans' carbonates, since Tsai teaches carbon nanotubes increase the service life of existing electron emitters for gas discharge devices.

10. Furthermore, since Heuvelmans admits that the composition may be adapted to include different electron-emitting material, it would have been obvious to one having ordinary skill in the art that the time the invention was made to use carbon nanotubes to emit electrons, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Further, one would be motivated to this configuration for a variety of reasons, including material availability and manufacturing processes with sensitive requirements.

11. Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the composition of Heuvelmans with carbon nanotubes mixed therein.

12. The Examiner notes that the claim limitation "wherein said carbon nanotubes are produced by a catalytic cracking and pyrolyzing of hydrocarbons" in claims 7 and 18, are drawn

¹ Heuvelmans, col. 2, ll. 39-48.

Art Unit: 2879

to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation.

Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, the intermediate steps of the process, recited in claims 8-11 and 19-22, are likewise not afforded patentable weight.

13. Regarding claims 2 and 4, Heuvelmans shows in figure 2, a composition for electron emitters of gas discharge devices comprising oxygen-containing compounds of alkaline-earth metal oxides.⁴

14. Heuvelmans is silent to the presence of carbon nanotubes mixed in the composition.

15. However, Tsai teaches carbon nanotubes (which are known to have a diameter between 1 and about 200nm) in a composition for electron emitters increases the service life. The reason for combining and motivation is the same as for claim 1.

16. Regarding claims 12, 14, 15, 43, and 44, Heuvelmans shows in figures 1 and 2, a gas discharge device comprising a gas and an electron emitter disposed in the gas,⁵ wherein the gas is capable of generating a discharge if interacting with electrons emitted by the electron emitter, and the electron emitter comprises a coating that comprises oxygen-containing compounds of alkaline-earth metals on an electrically conductive material (filament).

² Heuvelmans, col. 4, ll. 3-4.

³ Tsai, [0009].

⁴ Heuvelmans, col. 2, ll. 39-48.

⁵ Heuvelmans, col. 3, ll. 34-35.

Art Unit: 2879

17. Heuvelmans is silent to the coating having carbon nanotubes mixed therein.

18. However, Tsai teaches carbon nanotubes (which are known to have a diameter between 1 and about 200nm) in a composition for electron emitters increases the service life. The reason for combining and motivation is the same as for claim 1.

19. Regarding claims 23-25, Heuvelmans discloses the discharge device comprises mercury and a background gas of argon filled to a pressure of about 0.6kPa.⁶

20. However, setting the background gas to a pressure of about 0.3kPa or less is an obvious configuration, since this is a known pressure for operating discharge devices, and further, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. One would be arrive at this configuration for a variety of reasons, including material availability, and operation methods requiring sensitive parameters.

21. Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the discharge device of Heuvelmans and Tsai with the background pressure being set to about 0.6kPa.

22. Regarding claims 45-46, 41-42, 16-17, and 5-6, Heuvelmans and Tsai are silent to the amount of carbon nanotubes that are needed in the composition to produce a workable electron stream for the gas discharge device.

⁶ Heuvelmans, col. 3, ll. 34-35.

Art Unit: 2879

23. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. One of ordinary skill would be motivated to formulate this specific composition for a variety of reasons, including material availability.

24. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the gas discharge device of Heuvelmans and Tsai, with a proportion of carbon nanotubes in the composition being in a range from 30% to 90%, since discovering the optimum or workable ranges involves only routine skill in the art.

Response to Arguments

25. Applicant's arguments with respect to claim have been considered but are moot in view of the new ground(s) of rejection.

26. The Examiner notes that at numbered paragraph 19 of the previous office action, it was mentioned that Tsai and Heuvelmans failed to disclose or motivate Applicant's composition, including carbon nanotubes and alkaline earth metal oxides for electron emitters of gas discharge devices. However, after further consideration and scrutiny of the references, the motivation and teachings have been located as addressed above.

Conclusion

27. Previously cited USPN 6451175 published to Lal et al on September 17, 2002 is evidence that carbon nanotubes are known to have a diameter of about 10nm.

Art Unit: 2879

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

29. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Macchiarolo whose telephone number is (571) 272-2375. The examiner can normally be reached on 8:30 - 5:00, M-F.

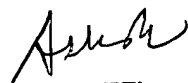
31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on (571) 272-2475. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

Art Unit: 2879

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

pm


ASHOK PATEL
PRIMARY EXAMINER